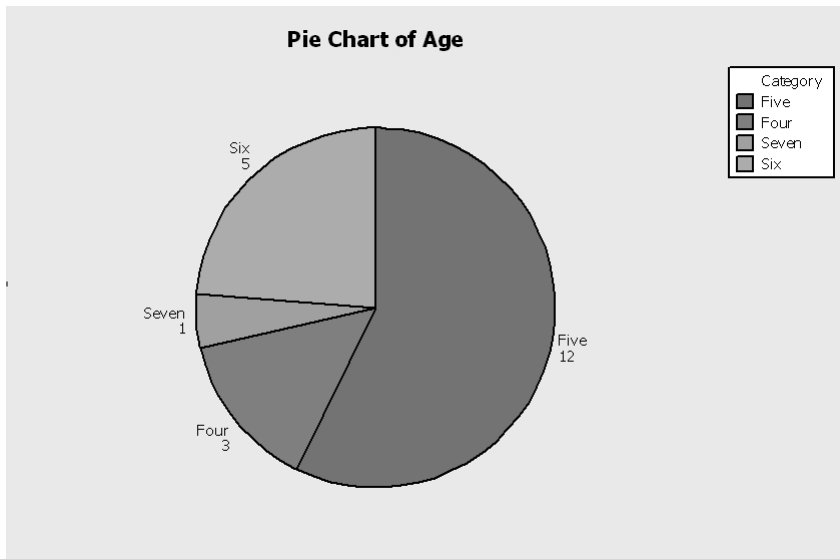


- (6) 1. A description of different shipping methods is given. Designate each of these variables as either **quantitative** or **categorical**. If the variable is quantitative, state whether it is discrete or continuous
- (a) weight of package _____
- (b) shipping method _____
- (c) time until arrival at destination _____
2. The following is a pie chart summarizing the ages of a kindergarten class (4, 5, 6, and 7 year olds).



- (2) (a) Approximately what percentage of the class is made up of 6 year olds?
- (2) (b) Make a bar graph to represent this data.
- (7) 3. Consider the following stem and leaf plot, representing the number of books read per year by the 14 students in the 8th grade at a private school.
- | | | |
|---|---------|--|
| 1 | 1 | |
| 1 | 6 | |
| 2 | 3 4 | |
| 2 | 5 7 | |
| 3 | 1 4 4 5 | |
| 3 | 7 8 | |
| 4 | 2 3 | |
- (a) List the actual observations in the second 3 stem row.
- (b) Find the median.
- (c) Find the first and third quartiles.
- (d) In the space below, draw a boxplot representing this data.
- (e) Is this data evenly distributed, left-skewed, or right-skewed?

- (2) 4. Veterinarians often use nonsteroidal anti-inflammatory drugs to treat lameness in horses. A group of veterinary researchers wanted to find out how widespread the practice was in the United States. They obtained a list of all veterinarians treating large animals, including horses. They sent questionnaires to all the veterinarians on the list. Such a survey is called a census. The response rate was 40%.

(a) What is the population of interest? _____

(b) What is the sample? _____

5. A bag contains 28 marbles. There are 14 pink marbles, 10 turquoise marbles, and 4 black marbles. You randomly select one marble from the bag.

(2) (a) What is the probability that the marble is pink? _____

(2) (b) What is the probability that the marble is not black? _____

6. The following table shows the ABO and Rh blood-type probabilities for people in Canada.

		ABO Type			
		O	A	B	AB
Rh type	Positive	0.38	0.34	0.09	0.03
	Negative	0.07	0.06	0.02	0.01

ABO Type and Rh Type are two different ways of determining blood type. Assume the table represents the entire population, and suppose a Canadian resident is selected at random. Find the probability that they have:

(2) (a) Type A blood _____

(2) (b) Type AB Negative _____

(2) (c) Type A or B blood _____

(2) (d) Type A and B blood _____

7. Parents tend to be very good at diagnosing their children's routine medical problems. If an ailment is identified correctly, a trip to the doctor's office may be avoided. A physician may confer with a parent by telephone and simply call a pharmacy with a prescription for an antibiotic. Suppose parents are correct 90% of the time, and 6 families with a suffering child are selected at random.

(2) (a) Calculate the probability that all parents are correct. _____

(4) (b) Calculate the probability that at most 3 parents are correct. _____

- (2) (c) Calculate the mean and standard deviation of families correctly diagnosing their children.

mean:

standard deviation:

- (2) (d) How many families should be selected so that the sample mean is 72? _____

8. You roll a pair of fair dice and compute the number of spots on the two sides facing up. Denote this total by X . The probability distribution of X is

X	2	3	4	5	6	7	8	9	10	11	12
Probability	1/36	2/36	3/36	4/36	5/36	6/36	5/36	4/36	3/36	2/36	1/36

- (2) (a) Explain why this is a valid probability distribution.

- (2) (b) What is the probability that X is at least 8? _____

- (4) 9. Opinion polls find that 20% of American adults claim that they don't have time to relax. Suppose you take a random sample of 200 American adults and count the number X in your sample that claim that they never have time to relax. Calculate (or estimate) the probability that 50 or more of these adults will claim that they never have time to relax?

- (12) 10. Answer the following with True or False. If False, explain your answer (short answer).

(a) All binomial distributions can be approximated using the Normal distribution. _____

(b) The sample mean varies from sample to sample. _____

(c) If the underlying population is not Normal, the Central Limit Theorem says the distribution of \bar{X} approaches a Normal distribution as n increases. _____

(d) All variables with infinite count are continuous. _____

(e) A level C confidence interval for a population mean is guaranteed to contain the true value of μ .

(f) In a hypothesis test, there are four possible alternative hypotheses. _____

- (5) 11. A random sample of 18 professional wrestlers was obtained, and the annual salary (in dollars) for each was recorded. The sample gave a mean of $\bar{x} = \$47,500$. Assume the distribution of annual salary is Normal with $\sigma = \$8,500$.

(a) Find a 99.5% confidence interval for the true mean annual salary for all professional wrestlers.

(b) How large must the sample be for the margin of error to be reduced to at most 1000?

- (1) **12.** What happens to the shape of a t distribution as the sample size gets larger?
- 13.** Movie trailers are designed to entice audiences by showing scenes from coming attractions. Several trailers are usually shown in a theater before the start of the main feature, and most are available via the Internet. The duration of movie trailers is approximately Normal, with mean 150 seconds and standard deviation 30 seconds.
- (3) (a) What is the probability that a randomly selected trailer lasts less than 1 minute? (Hint: Remember there are 60 seconds in a minute)
- (3) (b) Find the probability that a randomly selected trailer lasts between 2 minutes and 3 minutes 15 seconds.
- (3) (c) What movie length separates the top 5% from the rest?
- 14.** Shetland wool is considered some of the finest in the world because it is soft, durable, and easy to spin. The mean fleece weight from typical sheep is $\mu = 3.25$ pounds with a standard deviation of $\sigma = 0.4$. Suppose a farmer has 100 sheep ready to be sheared.
- (1) (a) What is the distribution of the mean weight of sheep fleece?
- (2) (b) What is the probability that the average fleece weight of the sample is less than 3.23 pounds?
- (3) (c) What is the probability that the average fleece weight of the sample be between 3.30 and 3.38 pounds?
- 15.** The mean daily energy requirement for eight-year old boys is 2200 calories with standard deviation 358. An education researcher believes many students in this group do poorly in school because they have an inadequate diet and therefore not enough energy. A random sample of 37 academically at-risk eight-year-old boys was obtained, and they were found to have caloric intake of $\bar{x} = 2089$. Is there any evidence this group of students has a mean caloric intake below the daily energy requirement?
- (1) (a) State the Null and Alternative Hypotheses.
- (2) (b) Calculate or estimate the P-value.
- (2) (c) Conduct a level $\alpha = 0.10$ test of significance. Interpret your answer in the context of the problem.
- 16.** We wish to see if, on average, traffic is moving faster the posted speed limit of 65 miles per hour along a certain stretch of Interstate 70. On each of four randomly selected days, a randomly selected car is timed and the speed of the car is recorded. The data is as follows:
- | | | | |
|----|----|----|----|
| 75 | 68 | 66 | 71 |
|----|----|----|----|
- Assuming that speeds are Normally distributed with mean μ , we test whether, on average, traffic is moving faster than 65 miles per hour.
- (5) (a) Calculate the mean and standard deviation. Do not use your calculator, and show all work.
- (1) (b) State the Null and Alternative Hypotheses
- (2) (c) Calculate or estimate the P-value of the test statistic (be sure to clearly state the test statistic).
- (1) (d) Carry out a test of significance at level $\alpha = .15$. Interpret your answer in the context of the problem.
- (4) **17.** Recently the Health Services Purchasing Organization started a patient-focused funding (PFF) program in British Columbia. One component of this program included financial incentives for hospitals that operate more efficiently, which is associated with the patient average length of stay. In a random sample of 25 patients with congestive heart failure at Vancouver Coastal Health, the

resulting mean length of stay was 9.9 days. The standard deviation of the sample was 3.7 days. Assuming that the population distribution is Normal, find a 96% confidence interval for the true mean length of stay.

You are told that the population mean length of stay is $\mu = 12$. Can we say for a fact that this is not true? Does it seem likely that this is true based on your answer above?